Lat 41.25371 Lon -122.91259

United States Department Of Agriculture | Forest Service | Shasta-Trinity National Forests

Reply To: 3420 Date: December 13, 1989

Subject: Evaluation of Tree Mortality on Scott River Ranger District, Klamath NF (Rept. No. N89-27)

To: Forest Supervisor, Klamath NF

Rick Svilich, TMO on the Scott River RD, requested an evaluation of several mortality situations on the District. The areas were evaluated on September 19 and 20, 1989 by Dave Schultz and Gregg DeNitto from the Forest Pest Management Northern Service Area, and Rick Svilich and Hoop George from the District.

Stands in the Carter Meadows and Jackson Creek areas are largely comprised of red fir, with some white fir and minor components of mountain hemlock and western white pine. The areas of concern tended to be at the lower elevational limits of the distribution of red fir in the area. There were numerous red fir trees in these areas that were totally dead, as well as trees that had dead tops, dead branches scattered throughout the crown, fading foliage, and heavy flows of resin on the boles. The cause of the mortality and branch flagging is a complex of insects and diseases which were highly successful because low precipitation during the past few years reduced tree vigor. Red fir in the stands examined were infected with red fir dwarf mistletoe, Arceuthobium abietinum f. sp. magnificae. Red fir is the only host of red fir dwarf mistletoe in this area. Branches infected by red fir dwarf mistletoe are often also infected by Cytospora abietis, a canker fungus. This fungus is a weak parasite and is more active on branches infected by dwarf mistletoe or weakened by drought. Two small engraver beetles that breed in fir, Scolytus praeceps and S. subscaber, were responsible for killing branches and tops that had been weakened by drought, dwarf mistletoe and Cytospora infections. Drought stress and the loss of crown due to a variety of organisms allowed the boles of the trees to be successfully attacked by the fir engraver, Scolytus ventralis, and the fir roundheaded borer, Tetropium abietis.

Tree species other than red fir in these stands generally appear to be in much better condition. There was no mountain hemlock mortality in the stand and the western white pine mortality appeared to be associated with white pine blister rust infections. White fir mortality was generally seen only when a white fir was located in a clump of red fir that were dead or dying. Both red and white fir are hosts of the fir engraver. The aggregating pheromone produced by the fir engraver isn't particularly strong, but when populations are high, enough beetles may be attracted to an area to be able to overcome an intermingled host tree which is relatively healthy.

The major factor influencing mortality in these stands is drought stress acting on red fir infected with dwarf mistletoe. High stocking levels may have had an influence in the amount of mortality in some aggregations, although stocking did not seem to play a role in other areas. The most feasible way of preventing

future mortality in these stands would be to reduce the impact of red fir dwarf mistletoe. In areas where there is an adequately stocked understory which is not heavily infected with dwarf mistletoe, removal of infected overstory red fir will prevent repeated reinfection of the upper crowns of the understory. If the understory trees are free to grow at a fairly rapid rate, they will add new crown faster than infections can spread upward. This may require precommercial thinning to achieve, in which case white fir should be favored as a leave tree. This should produce a commercial stand with minimal mortality if the stand is not allowed to stagnate. In openings or areas which do not have a suitable understory to release, it will be necessary to plant. At elevations where white fir and red fir grow equally well, infection by red fir dwarf mistletoe can be avoided by planting white fir. Stands where the overstory is growing adequately can be retained if the appropriate level of growing stock can be maintained. Removing heavily infected trees and reducing competition will reduce mortality.

Any prescriptions prepared in the near future should recognize that there are fir trees in these stands which were attacked by the fir engraver during 1989, but which will not fade until the spring of 1990. Also, based on previous episodes of drought/fir engraver caused mortality in red fir, it is likely that mortality will take several years to return to normal.

The second situation examined involved mortality in the Scott River drainage. Most of the mortality was Douglas-fir, although dead trees of other species were also present. The dead Douglas-fir had been infested with the fir flatheaded borer, Melanophila drummondi, and the Douglas-fir engraver, Scolytus unispinosus. The major factor responsible for the current mortality is several years of below normal winter precipitation. Common contributing factors include shallow soils, and heavy stocking for the sites.

Numerous Douglas-fir trees on the District are currently infested with the fir flatheaded borer. These trees may take from 1 to 4 years to die. Even if precipitation is normal or above normal this winter, mortality during 1990 should be about the same level as 1989. It will take several years of adequate precipitation before mortality drops back to normal.

The current stand structure, as well as evidence of old fire scars, and the pattern of previous radial growth all indicate that ground fires maintained these stands in a relatively open condition until about 80 years ago. Fire protection has allowed an increase in the amount of biomass on some sites, largely in the form of hardwoods and brush. The high level of biomass has resulted in top and branch dieback of some trees, reduced growth rate of older conifers, and increased overstory mortality during dry periods. The dense hardwood and brush understory has also inhibited conifer regeneration. If the current trend continues in which overstory conifers die during periodic droughts and conifers do not regenerate, the stand will eventually be dominated by hardwoods and brush.

It may be possible to prolong the life of the existing overstory for wildlife habitat or for visual purposes. This would require a reduction in the biomass of hardwoods and brush which compete for soil moisture. Prescribed fire might be used in areas which have a relatively low accumulation of fuel, but considerable hand cutting would be required in many areas. Activities that reduce competition or expose mineral soil may result in some natural conifer regeneration. Some areas have so few conifers remaining, or those present are

in such poor condition, that investments in regenerating these sites are likely to be more rewarding than trying to preserve the existing overstory.

If you need additional assistance or would like to discuss this evaluation, please call Dave Schultz or Gregg DeNitto at 916-246-5087.

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